
PUBLIC UTILITIES COMMISSION

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July 6, 2016

TO PARTIES OF RECORD IN RULEMAKING 11-09-011:

At the Commission Meeting of June 23, 2016, Commissioner Catherine J.K. Sandoval stated that she will file a concurrence in Decision 16-06-052. The decision was mailed on July 1, 2016 without concurrence.

The concurrence of Commissioner Sandoval is now available and is attached herewith.

/s/ DOROTHY J. DUDA for
Karen V. Clopton, Chief
Administrative Law Judge

KVC:lii

Attachment

Concurrence of Commissioner Catherine J.K. Sandoval

**Order Instituting Rulemaking to Improve Distribution Interconnection Rules for
Certain Classes of Electric Generation and Storage, R. 11-09-011**

The new data-driven “California Interconnection Model” and 5-year pilot process the CPUC adopts through this Decision will improve the air Californians breathe by spurring clean energy investment and innovation that reduces the need for fossil-fueled energy resources. It accelerates the interconnection and deployment of distributed energy resources (DERs) including renewables to the electric grid. It makes the grid and interconnected energy resources more efficient and agile through communication to advanced Smart Inverters that can optimize DER exports to meet energy needs and safely adjust to grid conditions. It brings California measurably closer to our state’s goal of obtaining 50% of our energy from renewable resources by 2030.

This new California Interconnection process requires more upfront information from energy developers about proposed energy projects to be interconnected at a specific grid location. It orders utilities to methodically study grid conditions to identify any upgrades necessary to safely interconnect an energy project. This decision allows developers to elect a 25 percent “cost envelope” to hold utilities accountable for their grid integration cost analysis and estimate. Actual interconnection costs that fall within 25 percent above or below the projected grid interconnection expense will be deemed reasonable. This Decision protects ratepayers by aligning renewable developer and utility grid operator incentives to gather and use data and require line item cost accounting to bring clean energy resources online quickly and efficiently. This process will lower consumer energy bills by reducing financing costs for renewable energy projects, and thus the price for Power Purchase Agreements. It requires a reasonableness review for an application to recover the costs of any underestimates beyond the 25 percent cost envelope, mandating a showing that those costs were out of the utility’s control or ability to mitigate. By Labor Day 2016, utilities will file Advice Letters to incorporate this data-driven cost certainty process into the Rule 21 Interconnection tariffs, opening the window for new interconnection applications this fall.

Just as interconnection created competition, choice, and innovation in the telecommunications sector, and was key to the evolution and accessibility of the Internet, so too will this new California Interconnection Model be pivotal to our state’s ability to turn the electric grid into the backbone of our clean energy future. The Federal Communications Commission (FCC) enabled the safe interconnection of different types of devices to the telecommunications network through its landmark 1968 decision in *Carterfone*, 13 FCC 2d 420 (1968). Decades before mobile phones were widely available to the public, Thomas Carter invented the Carterfone in the late 1950s to get phone calls while he was working on his ranch and away from his landline Bell system telephone. The Carterfone used a two-way radio system to allow

a radio system user to hear and talk to a telephone caller with the assistance of a base station operator.

The FCC's *Carterfone* decision unleashed competition and innovation that brought the Internet, competitive choices, and new communications options to American households and businesses. The FCC implemented *Carterfone* in 1975 by adopting standards in 47 C.F.R. Part 68 to allow consumers to connect to the telephone network equipment compatible with the Part 68 rules designed to prevent network harm and promote consumer choice. The *Carterfone* Decision and Part 68 standards allowed the Internet to become accessible to all with a phone jack and a modem, and enabled wireless connections to the telephone network. The Internet would not have proliferated and become accessible to the public without *Carterfone*. Similarly, absent *Carterfone*, energy grid managers would not be able to use the communications protocols we adopt today to connect DERs to communications networks to manage energy resources and decrease fossil-fuel reliance. In recognition of its pivotal role in the development of the Internet, a vintage 1959 Carterfone is on display in the Computer History Museum in Mountain View. Today's Decision is the "*Energy Carterfone*," creating a new process and standards to interconnect renewable energy facilities to the electric grid and use communications networks to improve grid reliability, safety, and competition, and lower energy prices.

This Decision replaces the "Fast-track" interconnection process adopted in D. 12-09-018. The Fast-Trak process, developed through a party settlement and approved by this Commission in 2012, turned out to be a slow and sticky track that yielded uncertainty about the cost and timeline to develop renewable energy projects. The 2012 Fast-track process required DER developers to answer a few simple questions, "screens," but requested few technical and project details. Based upon a simple Fast-track application, the utility conducted a desk estimate, a "desk-imit," as I call it, using general information about grid conditions in the area where the applicant seeks to locate the DER facility. The utility and developer then entered into a Generator Interconnection Agreement (GIA), a non-binding estimate based on the "desk-imit," subject to a "true-up" adjustment to account for actual costs after construction and interconnection. As a Regulator and Professor of Contracts Law, I observe that the GIA was not a contract to interconnect at a specified price, but an agreement that provides an estimate subject to true-up when the actual price will be determined. Through the GIA, the developer and the utility agree to interconnect the energy project to the grid, and construct necessary safety upgrades to prevent power flow problems that could, if not mitigated, lead to grid overloading, equipment damage, blackouts, or fires. True-up often revealed that the "desk-imit" was off by a factor of hundreds or thousands, resulted in bills to the developer after interconnection construction that were one hundred to 1,000 percent or more higher than the "desk-imit."

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The uncertainty and delays resulting from the 2012 Fast-Track interconnection process raised the cost of renewable projects and decreased investment incentives. This happened in large part because that process required insufficient data to enter the Fast-Trak interconnection queue, and utilities made desk-imits based on inadequate data about the grid to predict the effect of connecting an energy project at a particular grid location. Neither were utilities required to use line item cost tracking in the true-up process, flaws this Decision resolves.

Thanks to the parties who recommended our review and consideration of the cost envelope model developed by the State of Massachusetts for renewable interconnection. The process we adopt today is not a Massachusetts 2.0 model. It is a new data-driven California Interconnection model that increases cost certainty, project and grid information from the application to the study and accounting process. It requires better data upfront, more utility study to produce accurate estimates, and holds utilities to those estimates within a reasonable range. It allows the utilities latitude to decide what analysis is needed to provide an accurate estimate. Those studies will create data to improve grid resource management to meet consumer demand and changing conditions. Line item cost tracking will increase transparency and accountability, benefitting consumers and renewable developers alike.

This proceeding convened the Smart Inverter Working Group (SIWG) in 2013, a forum for collaborative technical analysis by renewable and distributed energy developers, utility engineers, and the staff of the CPUC and the California Energy Commission (CEC). This Decision requires the utilities to file and serve an Advice Letter in 180 calendar days to incorporate the “Smart Inverter” Communications and Advanced Inverter Protocols recommended in the Phase II and Phase III SIWG reports. Smart Inverters allow DERs including renewables to export grid-compatible energy in alternating current at frequencies and voltage necessary for safe grid operation. In 2014, 90% of small-scale renewable generation connected to the grid through inverters. Yet, the inverters prevalent in California today have limited functions and less computing power than modern refrigerators. The Communications Protocols adopted herein enable utilities and grid managers to see, send and receive signals to, and control DERs in a cyber-secure manner. They describe the information models, communications and data standards, cyber-security and privacy requirements to manage the grid while protecting consumers and our national security.

In 2014 this Commission in D. 14-12-035, adopted seven functions that smart inverters must perform autonomously to increase safe integration of DERs including renewables. Those functions require: 1) “Anti-Islanding Protection,” to prevent electrocution and other hazards if distributed energy “Islands” were still exporting power during grid maintenance or repair; 2) “Low and High Voltage Ride-Through” to allow exports consistent with grid voltage

requirements; 3) “Low and High Frequency Ride-Through” to allow exports consistent with grid frequency requirements to transmit safe and reliable power; 4) “Dynamic Volt-Var Operation” to allow management of grid voltage and volt ampere reactive (VAR), both critical to maintaining safe and reliable energy flows; 5) “Ramp Rates” to allow default and emergency management of grid exports to align grid resources, demand, and conditions; 6) “Fixed Power Factor” to provide reactive power that maintains energy delivery momentum, and; 7) “Soft Start Reconnection” such as ramping or random time-based connections within a window, to allow renewable resources to safely come back onto the grid after a grid event.

The Phase II SIWG report recommends advanced inverter functions. This Decision requires the filing of advice letter to adopt advanced Smart Inverters functions to: 1) monitor key distributed energy resources data; 2) permit a “Cease to Energize” state at the Electric Connection Point and return to service depending on grid conditions; 3) trigger a “Maximum Real Power Mode” as needed for grid safety and reliability; 4) set “Real Power Mode” for grid regulation; 5) establish “Frequency-Watt Emergency Mode” to counteract frequency excursions during High or Low frequency events; 6) initiate a “Volt-Watt Mode” to respond to voltage changes in the local grid decreasing or increasing real power; 7) enable and disable settings for “Dynamic Reactive Current Support Mode” in response to dynamic variations in voltage (rate of voltage change), and; 8) permit “Scheduling Power Values and Modes” to schedule real and reactive power values and enable DER response to energy supply, demand, and grid conditions. Prompt adoption of communications enabled, advanced Smart Inverters will unleash new capabilities to monitor, manage, and harness energy and grid resources.

This Decision invites Investor-owned utilities to submit Applications to develop data asset management tools. The modern grid including smart inverters, smart meters, DERs, and utility facilities ranging from substations to transformers will produce terabytes of data. This demands new tools to enable a strong and agile electric grid, responsive to supply, demand and local conditions.

This Decision also orders the utilities to within 30 business days create an expedited interconnection process for behind-the-meter, non-exporting energy storage at the customer’s residence or business. This will accelerate deployment of customer-side storage resources to utilize DERs for the customer’s own energy demand and to balance grid needs. Today, rooftop solar systems produce abundant energy on sunny afternoons when grid demand is low, but none during the evening when grid demand peaks. Storage will enable a customer to shift the energy produced from their solar or other distributed energy system to meet the customer’s demand for energy including charging electric vehicles. Energy storage developers identified the 2012 interconnection process as a key stumbling block to deploying storage to meet energy needs, even for resource-constrained areas such as the Southern California regions facing a state of emergency due to constraints on natural gas to fuel electric power plants. This Decision speeds storage interconnection to align supply and demand and decrease reliance on

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fossil-fuel resources by allowing customers to store and use more of the distributed energy they produce.

Many thanks to the CPUC staff members who collaborated on the development of this Decision and proceeding. Thank you to the Interconnection Proceeding parties who spent years on this topic. Thank you to the members of the Smart Inverter Working Group who developed first-in-the nation technical protocols that unleash new opportunities for grid management and DERs. Special thanks to Frances Cleveland who led the Smart Inverter Working Group throughout the entire process, to our sister agency the California Energy Commission, and especially to the CEC Commissioners and to Linda Kelly who championed the SWIG process. Many thanks to all who worked on this proceeding, and for the wide-spread support for this Decision. I appreciate my colleagues' unanimous approval of this Decision, and thank them for their support. I humbly submit this new model for consideration of our regulatory colleagues around the nation. This "*Energy Carterfone*" California interconnection model adopted herein will unleash a new era of energy competition, innovation, and investment. I look forward to the new energy options and cleaner environment this Decision will spur.

Special Thanks to:

The Commissioners of the California Public Utilities Commission: CPUC Chair Michael Picker, Commissioner Michel Florio, Commissioner Carla Peterman, Commissioner Liane Randolph, and Commissioner Catherine Sandoval.

The Commissioners and staff of the California Energy Commission including staff member Linda Kelly.

Administrative Law Judges Marybeth Bushey, Dorothy Duda, and Chief ALJ Karen Clopton.

CPUC Energy Division including Director Ed Randolph, and Energy Division staff members:

Marc Monbouquette, Gabe Petlin, Molly Sterkel, Megha Lakhchaura, Manisha Lakhanpal, and Noel Crisostomo, and to past CPUC Energy Division Staff members and leaders who contributed to the SIWG and Interconnection proceedings and Decisions.

The CPUC Legal Division including General Counsel Arocles Aguilar, and lawyers Elizabeth Dorman, and Jason Reiger.

Commissioner Sandoval's Office: my Chief of Staff, Ditas Katague; my Legal and Water Advisor, Jamie Ormond; my Energy and Safety Advisor, Michael Colvin; my Communications Advisor, Bill Johnston, and; my assistants Lolita Hajian and Anna-Marie Madrigal. Extra thanks to Jamie

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Ormond for her expertise on Smart Inverters, renewable interconnection, and contributions to this Decision.

The Advisors to the CPUC Commissioners including Nick Chaset, President Picker's Chief of Staff, and Matthew Tisdale, Commissioner Florio's Energy Advisor.

The CPUC Star Division including Andrew Rico and Lillian Li.

The members of the Smart Inverter Working Group including Frances Cleveland who led the 3-year SIWG process.

Parties to the Proceeding.

Governor Brown, Senate Pro tem leader Kevin de Leon, Speaker Anthony Rendon, and the members and staff of the California legislature and the Governor's Office for their actions to make renewable energy deployment the law of the State of California.

Thanks to the California energy ratepayers and members of the public. This decision speeds deployment of competitive energy resources including renewables by promoting cost accountability.

Dated July 6, 2016, at San Francisco, California.

/s/ CATHERINE J.K. SANDOVAL
Catherine J.K. Sandoval
Commissioner